Carnegie Mellon University
**Software Engineering Institute**

# NMS
# Software Risk Evaluation

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# Software Risk Evaluation for USAID NMS Project

**Abstract** This is a description of the risks identified for the new management system (NMS) project during an SEI software risk evaluation (SRE) which was executed for the USAID Information Resources Management department (IRM) The SRE interviews were conducted on the staff of IRM and its contractors (James Martin and ManTech) The aforementioned interviews were conducted to determine the remaining risks associated with the NMS system, which is scheduled to be delivered to its users in the Washington, DC headquarters (HQ) and its many field missions in other countries on Oct 1, 1995

# 1 Introduction

The NMS project is divided into five business areas (BAs) Four of these BAs are being developed under the control of IRM and its contractors, the fifth area (AWACS) is being developed by another organization within USAID A Software Risk Evaluation (SRE) was conducted on the IMS portion of the NMS project AWACS is treated as a separate project for the SRE, hence the results include the perceived impact of AWACS on the IRM portion of the project, but do not say anything directly about AWACS The objective was to identify risks remaining to the project, and to suggest strategies to mitigate the risks

The SRE Team members were

- Bill Wood, Mark Borger, and Bob Holibaugh from the SEI (Sujoe Joseph for 1 day)
- Paul Eavy from IRM/OD in USAID
- Bill Anderson from IRM/SDM in USAID

SREs consists of four major phases

1 Data Collection

   During the data collection phase, structured interviews are held with various groups of people with expertise in specific areas of the project under evaluation There were 8 interview sessions during the week of May 8, and an exit briefing was given at the completion on May 12 The risks were summarized into 7 risk areas for the briefing

2 Analysis

   The analysis phase is generally conducted by the SEI team members at the SEI following the completion of either all of the data collection or a significant part of it At this time the data is consolidated and a preliminary report is generated to be used to facilitate the next phase

3 Mitigation

It is in the mitigation phase that the team meets to identify strategies that can be employed to mitigate the risks that were found during the data collection phase The team added two other people to form the mitigation strategies At the completion of this effort, a briefing to management is given to overview the recommendations

4 Report

The final phase is the preparation of the final report based on the recommendations that come out of the mitigation strategy meeting(s) The report is in the form of text that summarizes the findings and recommendations A formal presentation is given to the SRE sponsor and, with his approval, to all who participated in the data collection interviews

## 1.1 Overview of Process

There were 8 interviews sessions recorded Six of these sessions consisted of 2 5 hour interviews, followed by one hour of assigning magnitudes to the risks Two sessions consisted of a 1 25 hour interview, and a 0 5 hours of magnitude assignment There were between 2 and 7 people in each session These sessions created a total of 243 risks, 76 of which were judged to be severe, and were carried forward to the next stage A list of the 243 risks and their attributes is supplied in appendix C

The team held a consolidation meeting on the Thursday afternoon after completing the interviews, during which the 76 high magnitude risks were organized into seven (7) areas using the SEI taxonomy The 76 risks were both consolidated and abstracted into one briefing chart per risk area The risks areas are described in more detail in section 2 of the report

## 1.2 List of Risk Areas

1 Requirements

2 Design

3 Support Functions

4 Management

5 Human Communications

6 Planning and Tracking

7 End-user Operations and Training

## 1 3 Mid-Course Changes

The NMS project was re-organized after the data collection period was completed and the preliminary report was written, but before the mitigation strategy meeting It was decided that the mitigation strategy meeting should concentrate on activities to be performed by IRM after the

first delivery was completed This changed the goals in mid-stream, since the analysis performed on the original risks put emphasis on risks associated with initial delivery In order to satisfy this change, the document was changed as noted below

1 Those risks and recommendations which were directly tied to the first delivery were ~~struckthrough~~ in the document For example RQ3, RQ4

2 If the complete risk is struckthrough, there is no mitigation strategy suggested

3 If part of the risk is struckthrough, then part of the mitigation strategy may also be struckthrough

## 1.4 Document Structure

Section 2 contains a description of the risks and their mitigation strategies The first appendix contains the SRE exit briefing, in the briefing the risks overcome by mid-course changes have been struckthrough The second appendix contains the original list of risks

# 2 Risk Descriptions

## 2.1 Requirements

Below, the most critical risks in the Requirements area that were identified by the SRE team are described along with some recommended actions that could be taken to mitigate those risks

RQ1 • **Risk - Volatile and changing requirements** The NMS requirements are still creeping in a number of ways For some BAs, the screens are being demonstrated to the user, and changed to suit their needs This places the final decision on screen format with the programmers There is a good chance that a different set of users will want further changes to the screens Most of these changes are not being documented in such a way that tests can be easily derived Traceability to other phases of the life-cycle is poor

**Mitigation** Some of the risks must be tackled immediately, while others can be delayed Since the NMS will be installed on October 1, 1995, it is essential to prepare for system maintenance that will begin shortly after October 1, 1995 It is important to ensure that each separate BA understands and documents the requirements that it elicits from the users It is important the requirement be baselined, and that a requirement change process be established and enforced Since many of the existing requirements have not been documented it is essential the maintaining organization begin immediately to document and baseline the existing requirements

RQ2 • **Risk - Poorly documented, with little traceability between life cycle phases** The requirements were captured initially as the results of a business analysis (BA) using the AEW tool These results are very uneven, and some process definitions (especially those done early) having insufficient data to construct the software This is being improved with later BAs, where a better description has been included, but the earlier BAs are not necessarily improving the documentation In addition, the physical model of the data differs dramatically from the logical model This combination will make maintenance very difficult Finally, there is little or no traceability of requirements across the life cycle This lack of documentation will make it extremely difficult to manage future releases of NMS

**Mitigation** This is another risk that must be tackled immediately, while others can be delayed It is important to document any future requirements such that they serve as a basis for integration testing and training It is more important to prepare to establish traceability of the requirements as a basis for system maintenance Once the existing requirements have been baselined, it is essential that traceability across the life cycle be defined This traceability will form the basis for managing bug fixes and enhancements to the system

RQ3 • ~~**Risk - System support functions (rollout, rollup, legacy initialization) are not defined** System operation is dependent on many support functions, and these seem to have inadequate requirements For example~~

- ~~it is undefined how the legacy data will be used to initialize the NMS~~
- ~~the rollup of mission data by country, area etc is undefined~~
- ~~the rollout of the system to the missions is loosely defined~~

RQ4 • ~~**Risk - Cannot derive system test procedures** The requirements have not been adequately documented, and traceability of the requirements across the life cycle is poor, so it is difficult, if not impossible, to maintain the system. At the system level, it will be difficult to assign problem trouble reports, because the requirement cannot be tracked specific modules or subsystems. Furthermore, the development of test plans, procedures, and data for each subsequent release will need to be traced to baselined requirements.~~

## 2.2 Design

The most critical risks in the Design area are identified and described along with some recommended actions that could be taken to mitigate those risks

DS1 • **Risk - Inconsistent logical and physical models** The logical and physical models are inconsistent and substantially different, causing the logical model to be ignored This will cause later maintenance problems, and makes the development of test procedures difficult right now

**Mitigation** - The design is currently proceeding independently for each BA This will allow the system design to appear to make the most progress in the short term, but could cause major problems in the long term The current stovepipe models must be integrated, based on the BAs data ownership This means taking the physical databases and consolidating them into one or more integrated databases, and determining how the data spreads out between the data entry points and computations For example there are cases where an entered value on one screen should be placed into many table elements by the data entry program There are other cases where an analysis program will have to fetch data from the individual elements and collect them into a useful format for computation

Furthermore, USAID IRM should establish a design peer review process to review future design decisions and ensure a tighter integration of NMS subsystems

DS2 • **Risk - Stovepipe NMS subsystems and tables** The current physical models have been built in a stovepipe manner The BAs have replicated data items within each of their tables in different formats If the data is not consolidated, the users will have to enter the same data into a number of screens and copy results data from one screen to another, this is inefficient and will cause data integrity problems This also implies that many programs have overlapping functionality within each BA

DS3 • ~~**Unresolved design decisions.** There are a number of major design decisions that are yet to be made For example~~

- ~~is the data server to be RISC6000 or SPARC?~~
- ~~is the data in Washington to be replicated at all missions?~~
- ~~how is the data at each mission made available to other missions?~~
- ~~is the "leaf data" to be rolled up for transfer to other sites?~~
- ~~how are changes to data at the mission to be synchronized with changes elsewhere, and how is data integrity to be maintained?~~

DS4 • **Unpredictable system performance** The system performance has not been studied in any depth, and there are many performance issues to be addressed For example

- the data is optimized for transaction efficiency and will cause queries and analysis programs to be inefficient
- the execution of some processes requires bulk data transfer from the server to the client, which could bottleneck both the client and the network

- there has been no experimentation with fully loaded databases in the server or a significant number of clients to evaluate performance

Mitigation - USAID should build a model, based on empirical measurements, to predict NMS system performance Some analysis and experimentation of the performance must be organized This should use (or emulate) a network which can be configured similar to a large mission and to the DC offices Both typical and stressful end-user workloads should be used, and measurements should be made of both the responses to requests and the equipment (workstation and network) loadings Graphs should be drawn to represent the workload versus response efforts Some predictive analysis will be necessary at the early stages, and these may require simple models of the system It would be useful to have an end-user usage profile to assist with this effort

## 2.3 Support Functions

The term "Support Functions" was used to broadly categorize the program risks associated with the traditional software project support activities such as software quality assurance (SQA), software configuration management (SCM), integration, and testing Below, the most critical risks in the Support Function category identified by the SRE team are described along with some recommended actions that could be taken to mitigate those risks

SF1 • ~~Risk - No system integration czar - A critical risk in this category stems from the fact that USAID is serving as the system integrator for the NMS program and has not designated any office and/or individual to be the *integration czar* to make certain that the separately designed and developed subsystems will integrate in a reasonable way The Director of the SDM division is the *de facto* integration manager, but does not have the time, staff, nor funding resources to be effective in this role~~

SF1 • **Risk - Ad hoc software configuration management** Software configuration management (SCM) of the NMS program is very ad hoc and often times is by-passed by the development teams (e g , taking system prototypes to the field without SCM coordination, installing and changing unconfigured systems in the training facilities) The development teams view the scheduled milestone/delivery dates as nothing more than *drop points* on the schedule for which they merely take a system snapshot (without any validation or acceptance criteria) and dump their entire development directories onto a tape they deliver to USAID Finally, it is expected that these current bad habits of by-passing USAID's SCM procedures and dumping release tapes will further complicate the post-deployment SCM activities

**Mitigation** - For the post-release time frame, USAID should continue to define and document its emerging SCM process including the use of a Configuration Control Board (CCB) with authority over system release, problem reporting, and system changes USAID IRM should require that each BA have SCM plans that are visible and enforced As the NMS program moves out of its current prototyping mode into full scale development and ultimately into maintenance, USAID IRM should put in place SCM mechanisms to ensure that all of the software-related artifacts being produced (e g , source code, requirements, design, test cases, installation procedures) are baselined and that subsequent changes are under adequate configuration control

SF2 • ~~**Risk - Inadequate time allocated for testing** - Because of the compressed NMS schedule, there is insufficient time (and in some cases staff resources) to adequately follow and/or implement any of the NMS test plans The test plans, procedures, and data are not being used in any structured, controlled manner A major source of risk is the disregard for unit testing by the development teams and the lack of planned time on the project schedule to perform system integration testing and rework Also, since the NMS requirements are unstable, system testing will be difficult to plan and implement~~

SF3 • **Risk - Software test plans and procedures are weak** Presently within USAID IRM, the test plans, procedures, scripts, and data for the NMS systems are not being developed, published, or used

**Mitigation** - USAID IRM should establish (i e , define, document, staff, and follow) a system testing and integration process for NMS Moreover, additional USAID IRM resources should be assigned to the Interoperability Laboratory (IOL) to help with the difficult system integration and testing issues USAID should more clearly state in its NMS test plan the types of tests (e g , unit, functional, integration, system, acceptance, regression) that are required, and the testing roles and responsibilities for USAID and the development teams The IOL should develop and enforce a detailed integration and testing schedule in conjunction with the development teams, the SCM group, and BA's that is based on this priority-driven phase implementation/integration approach

SF4 • **Risk - Software quality assurance is lacking** Presently, USAID does not have a separate SQA group or project-level standards (e g , coding style, peer reviews, acceptance criteria) in place which puts the quality and reliability of the delivered NMS subsystems at risk

**Mitigation** - USAID IRM should more clearly define the role of SQA and have such a group begin to identify, define, and help to impose various project-level standards (e g , quality metrics, design methods, coding style, testing, SCM, peer reviews, project status/tracking reviews) During maintenance, the quality of the integrated database between the BAs can be improved by using a peer design review process It would also be worthwhile to do some spot check code reviews from each developer, and use this as a basis for further review plans

## 2.4 Management

Below, the most critical risks in the Management area identified by the SRE team are described along with some recommended actions that could be taken to mitigate those risks

MG1 • **Risk - Lack of management discipline** USAID has the classic symptoms of a Capability Maturity Model (CMM) Level 1 organization, because there is a complete lack of management discipline in the areas of project planning, progress/status reporting and tracking, and documenting key technical (e g , design trade-offs) and management decisions The development teams are following a rapid prototyping approach for the incremental development of the NMS subsystems, but USAID is trying to manage the program as a traditional full scale development/production project Clearly the customer (USAID) and supplier (ManTech) development and management approaches are misaligned

**Mitigation** - USAID IRM should begin working immediately to define and develop a more formal software project management system that can be used to accurately plan, estimate, execute, review, and track its software development programs USAID IRM should focus its attention on understanding (and reporting to senior management via periodic reviews) where the NMS program stands relative to the current plans and schedule by instituting technical and management reviews on a monthly basis in conjunction with critical milestones (e g , a new system release) Sometime after this first step, USAID IRM should develop a realistic and more detailed NMS project plan and schedule that truly can be used as a project management tool

MG2 • **Risk - Undefined organizational roles and responsibilities** The organization does not have well defined roles and responsibilities for its NMS program staff across the various IRM divisions and business areas In most cases, USAID project managers have been assigned key positions on the program without any prior relevant work experience (e g , project management, people management, system engineering, software engineering) or adequate training To further exacerbate the situation, the USAID IRM staff and these project managers have been placed in a high stress situation because of the USAID-imposed deployment date of October 1, 1995 for the NMS system

**Mitigation** - USAID IRM should be more active in providing its staff with software project management and client/server application development training Furthermore, USAID IRM should begin to define policies and procedures for CM, SQA, integration, and testing

MG3 • **Risk - Minimal management sponsorship of project support functions** Another symptom of the lack of management discipline manifests itself in the project support area Executive sponsorship for the SQA, SCM, and the interoperability test lab functions is weak Moreover, the development teams view these support functions as an impediment to progress choose to and are allowed by USAID to by-pass them entirely in many cases The critical drivers of these problems are clearly the lack of project schedule time and lack of staff resources at USAID

**Mitigation** - USAID IRM should continue to build the case to upper management and budget for additional resources in the project support areas (e g , SCM, SQA, testing) USAID IRM should also take a firmer stand with the development teams in order to enforce the support function processes being implemented This could be done for example by tieing the incremental progress payments to the development contractor more closely to release acceptance criteria defined by USAID IRM

MG4 • **Risk - Un-managed expectations regarding NMS program** Senior management expectations at USAID are currently un-managed with respect to the impossibility of delivering a fully functioning NMS system to the field by October 1, 1995 Also, the end-user expectations of the NMS system are being heightened and not managed

**Mitigation** - In the short term, there probably isn't anything that USAID IRM can do to change the existing situation as it relates to the unrealistic and/or heightened expectations of senior management and end-users regarding what capabilities the NMS system will provide the user by October 1, 1995 To minimize the impact of the likely political fallout after October 1, 1995, USAID IRM should be tracking and documenting the progress on the NSM program in an effort to provide management early indication of potential schedule or functionality slips or cost overruns

In conjunction with mitigating risk MG1, USAID IRM could produce a realistic (i e , not restricted by the October 1, 1995 end date) project schedule Such a schedule should define clear phases of development and system integration, and be based on a detailed Work Breakdown Structure (WBS) with actual application size and level of effort estimates This schedule could then be used to document all interim progress and potentially hedge against an incomplete NMS system rollout on October 1, 1995

MG5 • **Risk - Poorly defined decision making and commitment process.** The current organizational structure at USAID associated with the NMS system makes key decision making and enforcement difficult

**Mitigation** - Given the current political climate within the Management Bureau of USAID, this particular problem may not be solvable from the bottom (USAID IRM) up However, to mitigate any risks associated with the tension and lack of coordination/communication between the IRM and Financial Management (FM) groups, USAID IRM should develop a decision commitment process that builds on consensus from its staff and clearly documents and communicates its decisions to the various NMS stakeholders (e g , BA's, FM, end-users, senior executives)

## 2.5 Human Communications

Below, the most critical risks in the Human Communications area that were identified by the SRE team are described along with some recommended actions that could be taken to mitigate those risks

HC1 • **Risk - Dysfunctional management and technical communications**
Communications between all the NMS Business Areas (BAs) had been impaired due to the political situation ~~Communications between IRM Business Areas (BAs) and AWACS BA are non-existent due the current political situation This dysfunctional political situation between IRM and FM has resulted in a very frail relationship between IRM and FM The net result is that the FM BA is proceeding without any interaction with the IRM BAs The BAs being developed by IRM must at some point integrate with AWACS, but that will not happen before the Oct 1 delivery Communications between AWACS and IRM BAs is needed to allocate data elements, make database design decisions, and design the access to shared data~~

~~Communications between BAs being supported by IRM have also been impaired The Project Managers for each BA are responsible for their individual development efforts, and since there isn't an integration manager who can force the resolution of integration issues, the four IRM BAs are proceeding without the necessary coordination In many cases, the individual IRM BAs have created interim tables and data that they need from the other IRM BAs This lack of coordination must be corrected immediately if IRM is to deliver a useful system by Oct 1 The coordination must be established so that system is coherent which requires that integration decisions be identified, staffed, decided, and implemented by the IRM BAs~~

**Mitigation** - A stakeholder group that includes IRM management, the BA Program Managers, and end-users should be formed as soon as possible If a group exists that can perform this role, then the group should be formalized, augmented, and chartered to provide input to the maintenance effort Initially, this team may need some external facilitation to help it form, storm, and norm so that it can perform as quickly as possible The group charter and the roles and responsibilities of the team members must be defined, documented, and approved by team members This stakeholder group must establish an atmosphere where activities are planned, coordinated, prioritized, and managed for effective long term benefit

HC2 • Participation of end-users on the requirements and design activities has been inconsistent The requirements needs of the Washington, DC end-users is not the same as the foreign mission end-users During requirements analysis the Washington, DC users makes input on the requirements, while frequently another group of mission users reviews the results of the design activity This leads to rework and inconsistent requirements Unless representatives from all user groups participate in all software life-cycle phases, the requirements cannot be fully analyzed nor can the system become stable, because each group of users will have a different perspective and view the functionality of the system differently

**Mitigation** - End-user participation must be consistent across BAs and life-

cycle phases To ensure the consistency of participation, the stakeholder identified above can provide the necessary input A commitment from the stakeholder group team members and their managers must be obtained so that they can provide the needed input High-level USAID sponsorship may be key in obtaining this participation

This stakeholder group should contain members from each functional area, representatives from large and small missions, and the perspective of high-level USAID managers who will use system data The stakeholder group must include BA functional representatives, and one or two end-users from large and small missions Identifying team members in the DC area who can provide the large and small mission perspective will be key to obtaining that perspective The group must define, document (two pages like SEI Team Charters), and approve its roles, responsibilities, and commitments This group need not function as a team initially, but this should be the goal for the long-term

Use this team to review, validate, and test the requirements documents, the screens, and incremental deliveries Stakeholder group team members need not be full time participants, but they should be centrally coordinated by one individual who is a member of the CCB

HC3 • ~~Senior management has established a system due date without defining the system scope This approach has created a flurry of activity without the needed communications across the inter-dependent BAs This uncoordinated flurry of activity will not produce a useful system by the Oct 1 delivery deadline~~

## 2.6 Planning & Scheduling

Below, the most critical risks in the Planning and Scheduling area that were identified by the SRE team are described along with some recommended actions that could be taken to mitigate those risks

PS1 • ~~Risk The delivery of a fully functional NMS system to a prepared end-user is unlikely to happen The requirements are not stable, the schedule has been compressed and unstable, because there has been minimal coordination across the BAs Each BA is frantically defining, implementing, and testing the requirements with separate end-users groups The individual BAs have not integrated their schedules, nor have they identified the necessary intermediate milestones and deliverables needed to coordinate their efforts The net results is the duplication of database tables for shared data since one BA doesn't know when another BAs interface will be available Furthermore, IRM is unable to track the progress of the project since they don't have visibility into individual BAs and especially into the interfaces between BAs This lack of insight makes it difficult for IRM to prioritize the activities of the BAs and to make and record the appropriate decisions that will produce an NMS system with an integrated useful set of functionality~~

PS2 • Risk The planning that has been done by the BAs has been done in an all out effort to reach the October 1, 1995 system delivery This planning has been inadequate, because it does not identify necessary interfaces and design decisions that run across the BAs Therefore, the planning has been uninformed, because it does not address the integration issues Furthermore, the planning has been optimistic, because it is attempting to deliver a complete system by Oct 1 when the system has not been defined completely

Mitigation- Begin to develop an NMS level plan that is integrated across BAs to produce incremental system releases so that each release provides the end-user with a useful subset of NMS capabilities from across the BAs This is a more difficult and time consuming plan to produce and execute, but this plan guarantees that NMS will be useful to the end-user This plan must be documented, coordinated, approved by the NMS stakeholder group, and distributed so that all NMS stakeholders understand that they support the system Changes to the NMS plan must be documented, coordinated, and approved

The NMS plan needs to be at the system level and address the issues associated with system integration and testing The plan should ensure that sufficient time and resources are allotted for integration, testing, and rework This plan requires input and buy-in from IRM and the stakeholder group The objective of this plan is to get all the IRM development efforts focused, coordinated, and bought-in

Periodic meeting of the stakeholder group with IRM management, and the

BA Program Mangers must be conducted to review project status that tracks milestones, deliverables, and available resources These meeting can also be used to identify, document, staff, resolve, and implement critical technical and managerial decisions

PS3 • ~~Risk Since it will not be possible to deliver a full NMS systems by Oct 1, there needs to be some realistic contingency planning At this point IRM has not done any contingency planning Two types of contingencies plans are possible late delivery, or phasing development so that at any point in the development the integrated, tested system is an useful subset of the full system~~

## 2.7 End-User Operations and Training

Below, the most critical risks in the Management area identified by the SRE team are described along with some recommended actions that could be taken to mitigate those risks

US1 • **Risk** This NMS changes the way that USAID does business by changing almost all aspects of their work processes as well as supplying the end-users and system administrators with new and unfamiliar technology Any such large change will cause problems as it becomes operational The fact that training is scheduled for the months when home leave is used will exacerbate the problem In addition the ability of the users to get help with their problems will be poor, since the help desk system is not adequately planned, and there will be little on-site expertise to wean people into the new system

**Mitigation** Prepare to provide training and help-desk support for both technical and functional questions Training is the most effective tool to educate the end-user, but the system may not be available in time to provide that training In addition, the requirements may not be documented so that an effective class can be constructed The help-desk is the front-line in maintaining user good will Also, provide a Frequently asked Questions (FAQ) that is updated periodically with current fixes, work-arounds, and guidance Finally, provide a quick-response capability for catastrophic problems

US2 • **Risk** The end-users are being informed that a powerful system will be installed on October 1, which will coordinate their work efforts and provide many benefits The system to be installed is likely to have significant functional errors, many overlapping entries, and perform poorly Thus it will be a significant disappointment to the end-users, and could have long term repercussions

**Mitigation** Prepare the user for the reality of the current system by creating the stakeholder group, providing a help-desk, and FAQ Use the stakeholder group, the FAQ, the CCB minutes, and user documentation to spread the word on how to make the best use of NMS

US3 • **Risk** There are serious doubts about the whole plan to rollout the system to the field What is the scope of the changes to the end-user? ~~What architectures will be installed? How will legacy data be loaded into the system? How will its integrity be checked~~? What type of user support will be available locally to help push the new users up the learning curve, and to assist them with work-arounds for software defects? What kind of user support is planned at HQ to give remote assistance?

**Mitigation** Prepare to provide help-desk support for both technical and functional questions In addition, consider the value of a quick-response team that can go on-site to provide technical assistance for catastrophic problems

US4 • **Risk** A complete, robust, usable system is highly unlikely to be ready by Oct 1, though it may be possible to deliver a reasonable subset of the functionality Unfortunately, the political pressures within the department have prevented the prioritization of the capabilities to be delivered Hence,

the user has not been involved with capability prioritization, and if only a subset is done, then the user will get what has been completed, which may not necessarily be coherent or useful

**Mitigation** Establish the stakeholder group as described previously Use this group to establish priorities on enhancements, bug fixes, and other user related issues Define and implement a change request process and establish a CCB From this process, and the results of the CCB, provide end-users with periodic updates on system plans

US5 • **Risk** There is a large set of users world-wide that will require training on NMS The training will be required as each mission system is installed, and it will be required when people transfer from other locations, hire on, and change jobs

**Mitigation** Prepare the most effective training program possible, and emphasize during training how to get help after the system is installed Add a training element to the installation team so that the users get the most current information Prepare to assist the users once the system is declared to be operational The current plans are for hands-off assistance via a lightly manned help-desk

Organize the key training around the functions most needed and most likely to be utilized during the break-in period Also, provide a quick-response capability for catastrophic system problems

# 3 Conclusion

IRM should prepare for the post delivery software in two phases, short term and longer term In the short term phase, they should prepare for the maintenance crunch that will hit immediately after the system becomes operational The longer term phase can deal with improving the organization and software processes for future productivity and quality gains

1 In preparing for the operational system, the IRM should get a Configuration Control Board (CCB) with a defined process in place, to ensure that changes flow smoothly into operations, get end-user support capabilities in-place, since there are likely to be many initial problems, and to define a process for design clean-up, since its likely that the design will be non-integrated for the initial installation

2 In the longer term, IRM should define more robust software development processes, including change, configuration, and release management, an independent software quality assurance organization, project planning and tracking, requirements management, and negotiation testing

# Appendix A

This appendix contains the briefing given on June 2 The briefing is organized by risk areas, and includes 4 slides per risk area Risk, Causes, Goals, Metrics, and Activities

Carnegie Mellon University
Software Engineering Institute

# NMS Software Risk Evaluation

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# Summary of Risk Areas

**Support Functions**

**End-User Operations and Training**

**Requirements**

**Design**

**Planning and Tracking**

**Human Communications**

**Management**



# Goals

1. **Build foundation for post deployment support**
   - **software quality improvement**
   - **end-user training and support capabilities**
   - **improved software processes**
   - **configuration management**
   - **technology refreshment**



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# Support Functions Risks

~~No integration czar to make daily decisions, keep things moving, and remove stovepiping~~

~~Releases occur on schedule rather than after validation, with insufficient unit testing, and of poor quality~~

Test plans, procedures, and data are not being developed, published, and used

~~Insufficient time planned for system integration testing and rework~~

No independent SQA function or SQA standards

Post deployment CM function and release control will be problematic



# Support Functions

## Causes

1. CM scheme is ad-hoc
2. No independent SQA function
3. Insufficient test and integration capabilities
4. Inadequate documentation for maintenance



# Support Functions

## Goals

1. Have CM group capture and maintain knowledge concerning entire IS environment
2. Establish an independent SQA organization to establish standards, baseline current software, and monitor changes to the software quality
3. Establish strong management sponsorship for CM, SQA, and test and integration
4. Ensure that time planned for test and integration is sufficient

# Support Functions

## Metrics

1. Trends in problem reporting: per release, during integration, in field
2. Measure of scale of changes (e.g., new code added, old code deleted, old code modified) in a release
3. Percentage of configurable items that are captured in CM
4. Number of test scripts developed, executed, passed, failed
5. Percent resources allocated to support functions



# Support Functions

## Activities

1. **Form a CCB with authority over system release, problem reporting, and system changes**
2. **Establish an SQA function. Develop IRM processes and standards (the imposition of this will occur incrementally)**
3. **Establish a test/integration process**

Establish means: define, document, staff, and execute.



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# End User Operations and Training Risks

Magnitude of change (time of year, culture, process, workstations, skills) will cause major disruptions

User expectations are being heightened instead of managed

Inadequate rollout plan ~~(scope, architecture,~~ training, user support, ~~contingency, transition from legacy systems)~~

Users not involved in prioritization of sub-set functionality

Large number of users scattered worldwide to be trained



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# End User Operations and Training

## Causes

1. Magnitude of change (time of year, culture, process, workstations, skills) will cause major disruptions
2. Mission users have heightened expectations, but little involvement in prioritization of subset functionality
3. User support planning is inadequate
4. Large number of users scattered worldwide to be trained



# End User Operations and Training

## Goals

1. Provide human assistance to end-users to resolve: misunderstandings, confusion, work-arounds for errors and missing capabilities
2. Involve users in prioritizing changes and upgrades
3. Minimize disruption in transitioning from current system to new
4. Have timely system training and documentation available for those who need it



# End User Operations and Training

## Metrics

1. Trends in the number of user calls and the response time until a solution is found, and the number of overlaps (i.e., common problems) and lost staff hours
2. Periodic surveys of customer satisfaction
3. Trends in training participation and requests
4. Trends in acceptance of end-user change requests



# End User Operations and Training

## Activities

1. Periodically publish FAQ's, usage guidelines, tips, work-arounds, etc.
2. Develop a periodic survey mechanism
3. Define and implement a process for change request prioritization and implementation (integrated with CCB)
4. Continue help-desk support -- functional, technical
5. Establish a quick response capability (e.g., strike team, remote diagnostics) to diagnose and resolve problems as they arise

# Requirements Risks

**Still volatile and changes are not adequately coordinated, documented, managed, or approved**

**Poorly documented, with little traceability between life-cycle phases**

~~**System support functions (rollout, rollup, legacy initialization) are not defined**~~

~~**Cannot derive system test procedures from requirements**~~

# Requirements

## Causes

1. Requirements management process is ad-hoc
   - functional area users believe that they can change the requirements with little impact
   - lack of a requirements baseline
2. Inadequate documentation discipline in IRM at all levels
3. Insufficient adherence to the life-cycle methodology by IRM direct-hires and contractors



# Requirements

## Goals

1. Current business rules, processes, trade-offs, and decisions for each business area are documented and accessible
2. Management discretion to reject an NMS system without adequate documentation
3. Developers can easily trace requirements across the life-cycle



# Requirements

## Metrics

1. Percentage of applications in the IRM portfolio with complete documentation across the life-cycle
2. Percentage of applications for which documentation traceability matrix is complete
3. Trends in the level of impact related to implemented requirement changes



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# Requirements

## Activities

1. Form a working group to establish release procedures that are coordinated with the roles of the CM, SQA, and testing groups
2. Establish the practice of documenting and storing content of facilitated JAD and JRP sessions
3. Establish a peer review process for assessing the impact of implementing requirement changes on all life-cycle products

# Design Risks

Lack of continuity between the logical and physical representations (and tools)

~~Need to integrate tables and functions across BAs~~

~~Need decisions on data distribution, replication, rollup, and synchronization issues~~

System performance is unpredictable and may be unacceptable



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# Design

## Causes

1. Logical models were not updated routinely to match the physical models
2. BA subsystems were developed as stovepipes, and tables were not integrated
3. System performance has not been modeled or measured, and may be unacceptable; no resource budgets have been assigned

# Design

## Goals

1. Traceability and accountability between different levels of representation
2. Integrated the tables, screens, and programs to resolve:
   - redundant data entries
   - query vs. transaction efficiency
   - client vs. server execution
3. Predict with reasonable accuracy the performance impacts of system changes



# Design

## Metrics

1. Establish acceptable response time requirements for classes of end-user activities
2. Error density trends: map problem reports to modules/structures
3. Establish target resource budgets (e.g., CPU, disk, network, shared tables) for new applications/ functions
4. Trends in occurrence of redundant data elements in tables
5. Measure of resource usage in operation

# Design

## Activities

1. Establish a design peer review process, leading to design changes (e.g., tighter integration)
2. Build a model to predict performance impact of new functionality/applications and changes; parameterize the model based on empirical measurements.
3. Establish a process to review trends and change the design as required

# Planning and Tracking Risks

~~Oct 1 full system delivery a myth~~

- ~~compressed and unstable schedule~~
- ~~insufficient intermediate milestones and deliverables~~
- ~~unable to track project progress, prioritize, and record decisions~~

Inadequate, uninformed, optimistic planning without replanning

~~No realistic subset contingency plan~~



# Planning and Tracking

## Causes

1. Organizational culture inhibits realistic plans and schedules
2. Plans are not always updated to reflect requirement changes
3. Lack of training, experience, and tools for creating, maintaining, and tracking progress against plans



# Planning and Tracking

## Goals

1. Establish a core competence in project planning and estimating
2. Establish strong senior management sponsorship for regular progress reviews
3. Project managers regularly produce detailed, bottom-up, integrated project plans



# Planning and Tracking

## Metrics

1. Trends in the percentage of projects holding regular reviews with senior management
2. Trends in percentage of staff trained and proficient in project planning and estimating
3. Trends in the percentage of project managers using project planning and estimating
4. Trends in meeting project inchstones, milestones, and deliverables

# Planning and Tracking

## Activities

1. Establish a process for project planning and tracking activities
   - acquire project planning and estimating tools
   - train staff in use of project planning and estimating
2. Establish periodic project reviews with senior management and track action items to closure
3. Begin an activity now to establish and consolidate a plan for the NMS, verify the status of progress against the plan, and establish a schedule for periodic reviews of the plan

# Human Communications Risks

**Dysfunctional management and technical communications across interdependent business areas:**

- ~~AWACS marching to its own drummer~~
- dysfunctional politics, frail relationships

**Ineffective end user/developer communications**

- inconsistent levels of end user participation on analysis and design

~~Senior Management has set a definite due date but no definite system scope~~



# Human Communications

## Causes

1. **Unrealistic schedule deadlines and pressure has caused the BA's to operate as stovepipes with insufficient communication to integrate concepts**
2. **Agency politics and inadequate end-user participation has led to some software in which specific requirements have been under-emphasized**



# Human Communications

## Goals

1. Clear and effective vertical and horizontal organizational communication and coordination
2. Stakeholders involved in prioritization between maintenance and further development



# Human Communications

## Metrics

## 1. Survey instrumentation?



# Human Communications

## Activities

1. Form a stakeholder group which analyses, prioritizes, and decides between:
   - fixing defects
   - enhancing operations
   - adding new functionality
2. Form inter-BA teams for maintenance activities and some new capabilities
3. Establish a planning group to keep schedules realistic and keep communications open



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# Management Risks

Lack of management discipline in planning, tracking, and documenting decisions

Lack of well defined roles and responsibilities and training for assignments

Sponsorship of support roles (CM, QA, IOL) is weak

~~Currently building prototypes, not production versions~~

~~USAID organizational structures for NMS makes decision making and enforcement difficult~~



# Management

## Causes

1. Organizational culture is reactive, thus inhibiting proactive planning
2. Short-term perspective; produce results in 18 months or less
3. Lack of management appreciation for the value of software development and maintenance infrastructure



# Management

## Goals

1. **Management sponsorship for software development and maintenance infrastructure (CM, SQA, IOL, etc.)**
2. **Organizational sponsorship for project planning, estimating, and tracking**

Sponsorship defined as providing training, budget, and review



# Management

## Metrics

1. Trends in the number of staff assigned to software support areas
2. Trends in percentage of projects holding progress reviews with senior management



# Management

## Activities

1. Allocate staff and budget to support functions (CM, SQA, IOL, etc.)
2. Define CM, SQA, test policies and procedures
3. Establish periodic progress reviews with senior management and track progress on the NMS



# Summary

**Prepare for maintenance crunch**

- put CCB and other boards in place
- get end-user support capabilities in place
- define a process for design clean-up

**Define organizational software maintenance processes**

- change, configuration, and release management
- software quality assurance
- project planning and tracking
- requirements management
- integration testing



# Appendix B

This appendix contains the list of risks sorted by the SEI risk taxonomy source and the risk magnitude

Analyst's Name _____ C/S -USAI. ..rt3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| | **[A1] Requirements** | | |
| 1 | Requirements are not stable for some functional areas, not documented and models don't match applications, mission reqmnts not captured initially, inconsistent | A1 | 9 0 |
| 2 | Requirements creep & time crunch makes testing impossible | A1 | 9 0 |
| 3 | significant requirement changes still happening, has been hard to close off requirements in budget area | A1 | 9 0 |
| 4 | no overall strategy for data sharing between AID-DC and missions, which data where, synch, uploading, downloading, etc | A1 | 8 4 |
| 5 | Unstable and unknown req'ts, still seeing significant changes in req'ts Causing some rework | A1 | 7 8 |
| 6 | No good requirements documentation to develop tests from | A1 | 7 8 |
| 7 | Requirements are informal (comm verbally) and not documented for programmers | A1 | 7 2 |
| 8 | housekeeping and support activities may not be identified and implemented, no processing layer | A1 | 6 6 |
| 9 | Further req'ts change requests expected as more end users input/use occurs | A1 | 6 6 |
| 10 | Detailed planning in budget BA is being delayed because bus rules, req'ts are slow in coming from AID, JM | A1 | 6 0 |
| 11 | JM people have a tendency to control requirements elicitation | A1 | 4 8 |
| | **[A2] Design** | | |
| 12 | Dependency on AWACS for funds distribution and control is on critical path Are interfaces/functions well defined? | A2 | 9 0 |
| 13 | Interfaces between 2 db servers is still undefined Single db or multiple db is undefined | A2 | 9 0 |

Analyst's Name _____ C/S -USA[illegible]rt3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 14 | No pragmatic plan for the system rollout | A2 | 9 0 |
| 15 | Distributed data synchronization issues are not resolved | A2 | 8 4 |
| 16 | No modeling or experimenting with the architecture to ensure it meets user needs | A2 | 8 4 |
| 17 | Tables within different modules have significant overlaps, leading to poor data integrity | A2 | 8 4 |
| 18 | Interfaces between business areas especially FM, are not well defined Facilitator agreements not reaching programer | A2 | 7 8 |
| 19 | System size/complexity --> more coordination/dependency and/or integration | A2 | 7 8 |
| 20 | Architecture does not support both transactions (operational) and analysis (management oversight) | A2 | 7 8 |
| 21 | Decision support & impact on architecture is not thought out well Some BAA groups think a tool (like PIPE) will do this | A2 | 7 8 |
| 22 | actual server machine hardware is undecided and may cause problem in installing system before Oct 1 (senior management decision) | A2 | 7 8 |
| 23 | Performance issues can arise during the inter-operability testing | A2 | 7 2 |
| 24 | system engineering decisions need to be made across business areas wrt optimizing transactions and queries | A2 | 6 8 |
| 25 | How will dependencies on HR & other missing info be handled on Oct 1 system delivery? | A2 | 6 6 |
| 26 | Performance tradeoff issues related to data structure/input (transaction) vs queries (decision support) Budget system is an analytical subsystem | A2 | 6 6 |
| 27 | ISP stands for Integrated Stove Pipe (unscheduled interfaces between BAAs) | A2 | 6 6 |
| 28 | Performance issues are occurring & may be difficult to remove network, data-entry (1 5 minute response on transactions) | A2 | 6 6 |
| 29 | Recovery from failure in distributed environments is unexplored & will be done by hand | A2 | 6 6 |
| 30 | Early releases will be stovepipes with overlapping functions & data | A2 | 6 6 |



5.

Analyst's Name _____ C/S -USAIL >ort3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 31 | original technical architecture not sized properly for the accounting system, performance of future integrated system not predictable and hasn't be thoroughly | A2 | 6 0 |
| 32 | Data organization is geared to inputs and not supporting the output and performance needs | A2 | 5 6 |
| 33 | OPS design does not satisfy requirements | A2 | 5 6 |
| 34 | technical team developing more functionality on client machine than should be rather than on server because Visual Basic make that style easier, client machine potentially will be overloaded | A2 | 5 6 |
| 35 | Will later phase BAA's invalidate assumptions and/or design of earlier BAA subsystems? | A2 | 5 6 |
| 36 | Whose BAA legacy data should be used for oct 1 system (Incomplete data, hard to map to new tables structures, validation) data integrity | A2 | 5 6 |
| 37 | No transition plan for conversion of mission-specific and corporate data | A2 | 5 6 |
| 38 | May not be enough hardware (spindles) to do database recovery on the fly | A2 | 5 4 |
| 39 | Temporary tables that are shared by many groups may change when the actual HR tables are developed | A2 | 5 2 |
| 40 | No visibility into the size of the corporated db | A2 | 5 0 |
| 41 | Database model does not match the client server model | A2 | 4 6 |
| 42 | Budget BAA development environment configuration --> performance issues mirrors "real-world" scenarios/context), high phone call rate to ManTech expected early on | A2 | 4 4 |
| 43 | Performance related risk because of limitation over distribution functionality between client/server, results in too much function on the client vs server | A2 | 3 6 |
| 44 | Large data loads from legacy systems take place with recover "off", could be disruptive to operations | A2 | 2 6 |
| | | | |

Analyst's Name _____ C/S -USAID sort3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| | **[A3] Code & Unit Test** | | |
| 45 | Software not consistently unit-tested before delivery | A3 | 7 8 |
| 46 | Software delivered to test is too buggy | A3 | 5 4 |
| 47 | Some simple software principles "edit checks" are not being done within the applications by the developers | A3 | 4 6 |
| | **[A4] Integration & Test** | | |
| 48 | insufficient time to do subsystem integration | A4 | 9 0 |
| 49 | test plans are not visible (unit, functional, system integration, user acceptance) | A4 | 8 4 |
| 50 | No formal test plan and no testing scenarios | A4 | 7 8 |
| 51 | Testing being performed in an ad hoc manner causing delivery of large number of bugs to the field | A4 | 7 2 |
| 52 | Beta testing is a high risk and needs to be improved | A4 | 7 2 |
| 53 | Testing is being ignored, and there are no plans to fix defects | A4 | 6 2 |
| 54 | There are no well defined performance requirements to be used by TEST | A4 | 6 2 |
| 55 | some (functional, system) test plans have been developed without analyst input | A4 | 6 0 |
| 56 | Tests are developed from user documentation, which is poor | A4 | 5 8 |
| 57 | No capability to do stress testing | A4 | 5 6 |



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Analyst's Name _____ C/S -USAIL ..13 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 58 | New system functionality will me harder to test because legacy data does not exist for such testing does not exist for such testing, will take more time to validate if system meets AID req'ts | A4 | 4 0 |
| 59 | Problem trouble report process is new | A4 | 3 4 |
| | **[A5] Engineering Specialties** | | |
| 60 | maintenance effort for Oct 1 delivery not defined or planned | A5 | 7 4 |
| 61 | enterprise data management plan needs to be developed (maintenance of data, data integrity, backups, security, roll-back) | A5 | 7 4 |
| 62 | Undefined plan for functional user support -- help desk | A5 | 6 2 |
| 63 | no field representation after analysis may cause the creation of a DC rather than mission-oriented system, unique mission requirements may not be captured | A5 | 5 6 |
| 64 | no funding for documenting actual technical architecture as it being built | A5 | 5 6 |
| 65 | Until BAAs are integrated, maintenance will be expensive | A5 | 4 8 |
| 66 | Four separate security control systems (UNIX, Oracle, Network, Application) -- registration difficulties, access to data problem, unauthorized access, confusion to users, security compromises Centralized will come later (after Oct 1) security | A5 | 4 6 |
| 67 | documentation of changes to logical model needs to be done for traceability | A5 | 4 4 |
| 68 | Security problem with data being transmitted before activity is finalized | A5 | 4 0 |
| 69 | Sending sensitive procurement data over insecure data lines | A5 | 4 0 |
| 70 | system documentation has been coming in slowly | A5 | 4 0 |

Analyst's Name. _____ C/S -USAID sort3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| | **[B1] Development Process** | | |
| 71 | Not following through the IE methodology from the logical to the physical model rigorously | B1 | 7 8 |
| 72 | lack of continuity and consistency of applying IE methodology (breakdown at design phase in most cases), change in projects, locations, tasks, team composition, leads | B1 | 7 8 |
| 73 | No requirements traceability, and requirements creep is occurring, with overlaps of tables & functions | B1 | 7 8 |
| 74 | Programmers, rather than functional experts, are controlling requirements creep | B1 | 7 8 |
| 75 | No methodology for client server model | B1 | 7 2 |
| 76 | structure and discipline sacrificed for time | B1 | 7 2 |
| 77 | lack of traceability of implemented functions to design to requirements exists because of Oct 1 deadline | B1 | 6 6 |
| 78 | No concept of getting a release or build working & defect-free before proceeding to the next | B1 | 6 0 |
| 79 | lack of adequate documentation trail which can impact development and maintenance costs | B1 | 5 4 |
| 80 | not enough detail re deliverables related to what contractors produce, not strongly tied to accounts payable | B1 | 5 2 |
| 81 | The formal approval mechanism for fixes is not being followed | B1 | 5 0 |
| 82 | User level testing can change the software while the software is in TEST | B1 | 5 0 |

Analyst's Name _____ C/S -USAID Part3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 83 | Going to the field for user acceptance test rather than through integration environment (necessary because of poor functional defs ) | B1 | 4 8 |
| 84 | Rapid Prototyping environment rather than a production environment | B1 | 4 6 |
| 85 | Little documentation & it's inconsistent (security, design, test) Case tool document inadequate (high level BAA) | B1 | 4 4 |
| 86 | lack of planned training for IRM staff wrt new technologies | B1 | 4 4 |
| 87 | creation of corporate data model has caused tension between development teams and USAID data admin team, quality will suffer | B1 | 4 4 |
| 88 | IE methodology has weaknesses in transition from logical modeling to construction phase | B1 | 4 4 |
| 89 | Lacking information re client/server design is going from high level design (PAD, PALS) -> detailed design (screens, func units) (i e , methodology not well suited/adapted for C/S applications) | B1 | 4 2 |
| 90 | People are not using the CM tool effectively or following reasonable procedures | B1 | 4 2 |
| 91 | draft development standard document has not been approved and put in place and used | B1 | 3 6 |
| | **[B2] Development System** | | |
| 92 | Iterative cycle of "train some users," "capture some errors," "fix those errors " | B2 | 6 2 |
| 93 | Process specs are not easily transformed into code modules, MT using system spec to cover this void User interview is still required | B2 | 5 4 |
| 94 | ADW tool does not produce adequate DDL, | B2 | 4 6 |
| 95 | Tool set large and complex, and not complete | B2 | 4 6 |

Analyst's Name _____ C/S -USA, rt3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 96 | Centralized development environment is slowing development | B2 | 4 4 |
| 97 | CASE tool breakdown at construction | B2 | 4 4 |
| 98 | ADW tool has limitations wrt generating Oracle DDL, requires hand creation of scripts for use of stored procedures and triggers on server machine | B2 | 3 2 |
| 99 | ADW tool is a poor DDL generator for Oracle Irwin is used to store the physical model, Can synchronize Erwin with Oracle 7 1 database | B2 | 3 2 |
| 100 | Visual Basic interface with Oracle through ODBC has to be performed via hand-coded routines | B2 | 3 0 |
| 101 | Significant differences between the ADW & ERWIN models (50% in some cases) Does ADW have any value now? | B2 | 2 8 |
| | **[B3] Management Process** | | |
| 102 | Conflict in roles/responsibility between analysis-contractor and implementation contractor, causing delays to resolve technical issues | B3 | 9 0 |
| 103 | complete lack of management discipline in planning, tracking, documenting decisions, etc | B3 | 9 0 |
| 104 | No King of integration, and tables will need to be "scrubbed" to remove stovepipes | B3 | 9 0 |
| 105 | Master schedule does not serve as a good project management tool | B3 | 9 0 |
| 106 | management relationship between IRM-FM is stressed, FM is acting as another IRM shop, causing delays in senior management decisions, FM not playing as team player and not coordinating system design and development, working level relationships varies | B3 | 9 0 |
| 107 | beyond BAA's, there is a lack of detailed project plans (what are the tasks, deliverables, schedule, roles/responsibilities, level of effort) | B3 | 8 4 |
| 108 | No central program office exists for overall mgt responsibility (i e , mgt of contractor) who does what zero sum funding, overlapping capabilities | B3 | 8 4 |

Analyst's Name _____ C/S -USAID Sort3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 109 | Integration test definition is general, and has not been detailed Sponsorship for testing is low Testing is impediment to delivery | B3 | 8 4 |
| 110 | senior management making decisions given conflicting information | B3 | 8 0 |
| 111 | Schedule for integration & rollout will not be sufficient and can lead to stove-pipe systems and manual operations | B3 | 7 8 |
| 112 | Inadequate, uninformed, optimistic planning, no replanning | B3 | 7 8 |
| 113 | lack of clearly defined interim deliverables and milestones | B3 | 7 8 |
| 114 | Sponsorship for CM is lacking | B3 | 7 8 |
| 115 | non-system oriented staff being used in project management (how to manage contractors, expectations, ) | B3 | 7 8 |
| 116 | lack of management of expectation and changing of expectations | B3 | 7 8 |
| 117 | lacking management of contractor within USAID/IRM | B3 | 6 6 |
| 118 | No plan to provide a good small-scale system first rather than an ugly complete system | B3 | 6 4 |
| 119 | remaining level and scope of effort for post-Oct 1 not defined of planned | B3 | 6 0 |
| 120 | More project/plan detail needed for integration test team (activities, schedule, ) | B3 | 6 0 |
| 121 | confusion in project planning hierarchy | B3 | 5 8 |
| 122 | planning mechanism in use has not been used effectively in the past and project is in last 6 months of effort prior to Oct 1 roll-out | B3 | 5 4 |
| 123 | Spending lots of time handling interrupts & putting out fires for things that could be routinely scheduled | B3 | 5 2 |
| 124 | No mechanism for management to distribute relevant information in a timely and complete manner | B3 | 5 0 |
| 125 | CM is regarded as an impediment to progress | B3 | 4 8 |



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Analyst's Name _____ C/S -USAID sort3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 126 | Program mgrs are caught in the middle of conflicts between the two contractors | B3 | 4 4 |
| 127 | Test roles not clearly defined | B3 | 4 0 |
| 128 | No plan for post-deployment (post Oct 1, 1995) activities | B3 | 3 6 |
| | | | |
| | **[B4] Management Methods** | | |
| 129 | Post-deployment Configuration Management & release control will cause problems, especially with distributed nature | B4 | 8 4 |
| 130 | Poor quality products are delivered to meet deadlines | B4 | 8 4 |
| 131 | Lack of QA standards overall & within BAAs and no enforcement of existing ones | B4 | 7 8 |
| 132 | Releases occur on schedule, rather than tested & configured | B4 | 7 8 |
| 133 | No SQA function or staff | B4 | 7 8 |
| 134 | lack of visibility of schedule and the reporting/roll-up to USAID management | B4 | 6 8 |
| 135 | Unit test scripts and incident reports are not being delivered to CM with code | B4 | 6 6 |
| 136 | no SQA function related to software development deliverables | B4 | 6 2 |
| 137 | Test data is being destroyed when new versions are delivered & new tables are created | B4 | 6 0 |
| 138 | No correlation between releases to CM & problem fixes | B4 | 5 6 |
| 139 | SQA function does not exist | B4 | 5 0 |

Analyst's Name _____ C/S -USAID sort3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 140 | No effective prioritization of problems to direct fixes | B4 | 4 6 |
| 141 | No clean process for synchronizing development, baseline, and test CM Starting to come together | B4 | 4 4 |
| 142 | No trending of defect creation and fixes | B4 | 4 2 |
| 143 | program relying on key individuals on USAID side and with contractors | B4 | 4 0 |
| | **[B5] Work Environment** | | |
| 144 | AWACS is not a full team player and this could lead to integration problems | B5 | 9 0 |
| 145 | communication breakdown between functional and technical teams | B5 | 9 0 |
| 146 | inconsistent end-user participation across analysis/design/construction teams | B5 | 8 4 |
| 147 | lack of technical communication between business areas (funds control to budget to OPS to A&A) | B5 | 8 4 |
| 148 | There is no good technical conflict resolution mechanism to reach decisions and enforce them | B5 | 7 8 |
| 149 | JM oversells to management, and management buys in | B5 | 7 4 |
| 150 | Communication across development teams is weak | B5 | 6 6 |
| 151 | staff stress level is increasing, tension between contractors is increasing, staff feeling pressures, less than perfect communications | B5 | 6 2 |
| 152 | BAAs are working as separate groups, but not as a single team True of everyone "I don't have time " | B5 | 5 6 |
| 153 | No mechanism to encourage communications & team-playing | B5 | 5 6 |

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 154 | not having user participate in design phase | B5 | 5 2 |
| 155 | There is tension working relationships within USAID--between COTRs & program office | B5 | 4 8 |
| 156 | Oracle needs to be managed & there is no plan to do this | B5 | 4 8 |
| 157 | Some James Martin people come across as being very arrogant, and this causes tension/conflicts | B5 | 4 6 |
| 158 | increase in conflict, paranoia, defensiveness | B5 | 4 6 |
| 159 | high stress among staff because of tight schedule, no mistakes are allowed, added visibility of reengineering of AID (NPR) | B5 | 4 4 |
| 160 | Low morale across the agency | B5 | 2 6 |
| | | | |
| | | | |
| | **[C1] Resources** | | |
| 161 | insufficient (less than solid) plans/schedules for getting to Oct 1 deadline | C1 | 8 4 |
| 162 | compressed schedule -->long hours, high stress, testing/integration time Schedule highly parallel producing increased communications | C1 | 7 8 |
| 163 | Integration test is only been given a week in the schedule, and there is only one pass | C1 | 7 8 |
| 164 | schedule has not been stable, original 5-year schedule compressed into 21year | C1 | 7 8 |
| 165 | Support functions are understaffed (CM , TEST, QA [none]) and report to development manager | C1 | 6 6 |
| 166 | Turnover is an issue, inadequate long term knowledge | C1 | 6 2 |
| 167 | James Martin(JM) people appear to be good at BAA (analysis) part but do not have sufficient skills in design and implementation | C1 | 6 0 |

Analyst's Name: _____ C/S -USAID Report3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 168 | Budget for post-Oct 1 not approved, pre-Oct budget for infrastructure may be low | C1 | 5 6 |
| 169 | Being done out of schedule pressure, not ignorance, will cause lots of rework | C1 | 5 4 |
| 170 | USAID staff put in project management positions without any training and any guidance on how to plan and execute, BA's did planning differently | C1 | 5 4 |
| 171 | variability of personnel experience across teams wrt client/server, development environment, system functionality | C1 | 5 2 |
| 172 | Experienced staff attrition -- How to maintain skill set required | C1 | 5 2 |
| 173 | Impossible to meet the schedule | C1 | 5 2 |
| 174 | NMS budget is not stable | C1 | 5 0 |
| 175 | Mantech is losing people too fast, since once people become knowledgeable, they leave | C1 | 4 8 |
| 176 | Levels of VB coding experience may lead to more complex code that is harder to maintain by junior staff members | C1 | 4 2 |
| 177 | low budget levels for direct hire training | C1 | 4 2 |
| 178 | sufficient user expertise lacking in BAA efforts in HR | C1 | 4 0 |
| 179 | Resources for program mgt are insufficient | C1 | 3 8 |
| 180 | Lack of training and expertise in using the ADW tool | C1 | 3 4 |
| 181 | Will the contract "cap" mean that contractor goes away prematurely | C1 | 3 4 |
| 182 | Budget information is not available to program managers | C1 | 3 2 |

Analyst's Name. _____ C/S -USA... ...rt3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| | **[C2] Contract** | | |
| 183 | contracting (best value) causes contractor staff turnover | C2 | 5 6 |
| 184 | over reliance on contractor staff because of change of work from development to maintenance(especially during Deputy Dir transition period), lack of training for client/server paradigm, lack of funding for training | C2 | 4 8 |
| 185 | ownership of COTS software used (OPS BA team tech ) | C2 | 1 8 |
| | **[C3] Program Interfaces** | | |
| 186 | AWACS marching to own drummer | C3 | 8 4 |
| 187 | decision on Unix servers has become political (IRM - SunSPARC, FM - R6000), if IBM R6000 chosen, Oct 1 deadline highly at risk | C3 | 8 4 |
| 188 | lack of definitive guidance from senior management on scope of NMS project, delivery, etc | C3 | 7 8 |
| 189 | political issues, relationships need to be worked out | C3 | 7 8 |
| 190 | leading edge technologies make it difficult to manage conflicts among contractors | C3 | 6 6 |
| 191 | No senior-level bureau buy-in for the system | C3 | 5 6 |
| 192 | bifurcation of IRM function | C3 | 5 6 |
| 193 | AWACS not being included in SRE scope | C3 | 5 2 |
| 194 | DTS-PO has responsibility for oversea telecom, USAID request for 64KB lines to over 40 missions cannot be met by Oct 1, looking for alternate source of VSAT, but have no contract vehicle currently, zero experience related to deploying this technology | C3 | 5 0 |

Analyst's Name _____ C/S -USAI... ...ort3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 195 | IRM not high enough in decision/authority hierarchy to enforce discipline in management decision and use of methodology | C3 | 4 8 |
| 196 | There may not be sufficient hardware equipment because the original assumption was 1 microcomputer per person but now microcomputers might have to be shared | C3 | 4 6 |
| 197 | Initial system availability is questionable (uncertain) | C3 | 4 6 |
| 198 | high reliance on contractors for technical skills | C3 | 4 6 |
| 199 | At least one executive sponsor is not fully committed to the system | C3 | 4 2 |
| 200 | due to political culture some good people don't get credit (MT) and less than strong staff get praise (JM) | C3 | 4 2 |
| 201 | A/A believes that JM is solely responsible for success/failure of NMS program, JM project does not believe this is the case | C3 | 4 2 |
| 202 | Data rollup not complete without small mission data | C3 | 3 4 |
| | **[C4] End user Operations and Training** | | |
| 203 | lack of adequate project tracking, documented decisions, no prioritization of end-user requirements being performed | C4 | 9 0 |
| 204 | living with myth that subsystems will be delivered on Oct 1, not open as a senior management discussion topic | C4 | 9 0 |
| 205 | Magnitude of change (cultural, functional, hardware, operational, policy, skill set) on the program in short amount of time ("Big Bang") | C4 | 9 0 |
| 206 | NMS roll-out plan still lacking detail, being held up by mission server decision, can the NMS roll-out happen effectively before Oct 1 | C4 | 8 4 |
| 207 | unrealistically high expectations on end-user side | C4 | 8 4 |

Analyst's Name _____ C/S -USA, rt3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 208 | high uncertainty regarding post-Oct 1 budget for maintenance and continued development, hype associated with client/server may make justifying maintenance budgets harder | C4 | 8 4 |
| 209 | no budget for NMS system help desk/hotline | C4 | 8 4 |
| 210 | Data replication across AID-DC & missions (How, what, frequency), uncertain req'ts Should it be automated | C4 | 8 4 |
| 211 | No realistic contingency plan | C4 | 8 0 |
| 212 | operational environment and technical architecture at some missions is not stable and prepared for NMS system installation, development environment also unstable | C4 | 7 8 |
| 213 | extension (8,000) end-user system training needs to be done, can train-the-trainer be used, tutorials (how to do it?, when to do it (August/September)) | C4 | 7 8 |
| 214 | seasonality of NMS training may conflict with staff annual leave, especially for foreign staff planning home leave in August/September | C4 | 7 8 |
| 215 | compression of roll-out has deflected schedule and plans | C4 | 7 8 |
| 216 | confusion of roles related to training, users will not be able to use systems delivered on Oct 1 | C4 | 7 8 |
| 217 | plan for conversion and validation of legacy data into RDBMS not well defined | C4 | 7 8 |
| 218 | what will be delivered and where on Oct 1 | C4 | 7 8 |
| 219 | ill-defined subset of feasible system to be delivered on Oct 1 | C4 | 7 8 |
| 220 | mis-management of end-user and customer (USAID) expectations for what the system will be on Oct 1 | C4 | 7 8 |
| 221 | Moving data between current tables is not planned, especially between two sites | C4 | 7 2 |
| 222 | Use of legacy data, and how to scrub it is still an open issue, with plans to run legacy systems for extended period | C4 | 7 2 |
| 223 | Intersecting use of runtime files will cause client crashes | C4 | 7 2 |

Analyst's Name _____ C/S -USAI[illegible]ort3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 224 | End-User training necessary for properly understanding/using new system, Help desk necessary, high phone call rate to MT expected early on | C4 | 6 6 |
| 225 | Synchronization of mission vs DC dbs is undefined | C4 | 6 0 |
| 226 | system data flow from DC-to-missions not well defined | C4 | 6 0 |
| 227 | operational transition plan from existing to new system not visible | C4 | 6 0 |
| 228 | Lack of "user profile" data for missions & DC to determine if architecture is efficient | C4 | 5 6 |
| 229 | most end-users do not understand what NMS will mean, some are indifferent, some fear it, some have high expectations | C4 | 5 2 |
| 230 | Training plan is not clear | C4 | 5 2 |
| 231 | operational decisions for small missions still need to be made | C4 | 5 0 |
| 232 | organizational processes being defined and put in place as the NMS system is being developed | C4 | 5 0 |
| 233 | Missions uninvolved with requirement, will not like the system | C4 | 5 0 |
| 234 | users cannot use old systems, but new systems might not fully replace functionality of old | C4 | 4 6 |
| 235 | end-user functional training may not be sufficient, may be behind schedule, | C4 | 4 6 |
| 236 | No determination of data to be stored at missions, probably not enough space to replicate all live data at missions | C4 | 4 4 |
| 237 | Software might not run on anything less than 486 with 8mb | C4 | 4 2 |
| 238 | Software delivery to remote missions will not happen by Oct 1, leading to unresolved operational issues for the missions not receiving the installs | C4 | 4 2 |
| 239 | some missions do not have equipment to run planned systems | C4 | 4 0 |
| 240 | Missions are being promised access to DC db, & this is not on a schedule | C4 | 4 0 |

Analyst's Name _____ C/S -USA, ...ort3 Worksheet

| Risk # | RISK STATEMENT | Source of Risk | RISK MAGNITUDE |
|---|---|---|---|
| 241 | changing technical architecture before Oct 1 may not be possible | C4 | 3 8 |
| 242 | System configuration rules may cause increased user workload (centralized PCs) | C4 | 3 8 |
| 243 | user procedures for results tracking not defined before or concurrently with software | C4 | 3 8 |